St. Louis City
QUALITY ASSURANCE PROJECT PLAN FOR SLAMS/NAMS/SPMS/$PM_{2.5}$ AMBIENT AIR QUALITY MONITORING

STATE FISCAL YEAR 2005

Prepared by the
St. Louis Department of Health
Air Pollution Control Program

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Distribution List

Individual	Title	Agency Represented
Tom Wilson	**Director**	**APCP, MDNR**
Earl Pabst	Director	ESP, MDNR
John Madras	QA Manager	DEQ, MDNR
Calvin Ku	Chief, Technical Support	APCP, MDNR
Terry Rowles	Unit Chief, Monitoring	APCP, MDNR
Don Gourley	Supervisor, AQAU	ESP, MDNR
Diane Harris	Acting Quality Assurance Manager	EPA Region VII
Mike Davis	Laboratory Chemist	EPA Region VII
Tom Wiese	Technical Services Manager	APCP, STLHD
Andrew Hilliker	QA Manager	APCP, STLHD
Wayne Wilhelm	Laboratory Supervisor	STLCHAL

QUALITY ASSURANCE APPROVALS

QA Manager John Madras 9/13/04
John Madras, Signature — Date

PROGRAM APPROVALS

Project Manager, APCP Tom Wiese 8-9-04
Tom Wiese, Signature — Date

Director, APCP Leanne Tippett Mosby 9/3/04
Leanne Tippet, Signature — Date

Project Coordinator, APCP 9/1/04
T. Calvin Ku, Signature — Date

A. Project Management

1. Project / Task Organization

1.1 Key Program Personnel / Areas of Responsibility:

Sampling Operations:	Tom Wiese AQMS, STLHD
Sampling QC:	Andrew Hilliker, AQMS, STLHD
Laboratory Operations	
$PM_{2.5}$	Wayne Wilhelm SLCHAL
Laboratory QC	
$PM_{2.5}$	Dennis Shroeder, AQMS, ESP
Data Processing Activities:	Tom Wiese, APCP STLHD Andrew Hilliker, APCP STLHD
Data Processing QC:	Tom Wiese, APCP, STLHD Andrew Hilliker, APCP, STLHD
Data Quality Review:	Tom Wiese, APCP-STLHD Andrew Hilliker, APCP-STLHD Terry Rowles, APCP-MDNR
Performance Auditing:	Don Gourley, AQAU, ESP
Systems Auditing:	Mike Davis, Lee Grooms, U.S. EPA
Overall QA:	John Madras, ALPD - MDNR
Overall Project Coordination:	T. Calvin Ku, APCP - MDNR

1.2 Major Functions:

APCP - MDNR – Monitoring & Data Analysis Unit

1. Coordinate state ambient air monitoring network.

2. Obtain, distribute, and manage funding for maintaining state monitoring network including equipment replacement and new equipment purchases.

3. Review and evaluate QAPPs from MDNR, local agencies, or industries.

4. Conduct annual monitoring network review and propose changes to the Environmental Protection Agency (EPA).

5. Determine new siting locations and review existing sites to meet the monitor siting criteria.

6. Review and compile statewide data from reporting agencies.

7. Submit state air quality data to the Aerometric Information Retrieval System (AIRS).

8. Perform air quality and trend analyses.

9. Prepare reports and respond to requests for information.

10. Evaluate federal regulations for their impact on the state network.

11. Coordinate ambient monitoring data with enforcement efforts, negotiations with responsible parties, and development of state regulations.

12. Promote protection of the air as a valuable natural resource.

APCP - STLHD - Air Quality Monitoring Section

1. Responsible for overall quality of air pollution monitoring data. This includes data validation and quality control procedures.

2. Collect filter-based and continuous criteria pollutant data; review data for errors and malfunctions, assist with AIRS and the Precision Accuracy Reporting System (PARS).

3. Perform required weekly, biweekly, or monthly checks of instruments; evaluate instrument performance and take corrective action when needed; maintain appropriate instrument certifications.

4. Evaluate the condition of field equipment and maintain equipment replacement schedule. Purchase equipment needed to complete monitoring commitments as resources allow.

5. Install new sites; install and calibrate monitoring instruments.

6. Lease property for air monitoring sites and contract with cooperators.

7. Provide technical assistance to air monitoring field staff from other agencies.

8. Promote protection of the air as a valuable natural resource.

SLCHAL – Laboratory Unit

Filter Weighing Functions

1. Evaluate weighing room, equipment, supply, and storage needs. Make purchases to accomplish Fine Particulate Matter ($PM_{2.5}$) weighing objectives as resources allow.

2. Operate $PM_{2.5}$ weighing lab, including filter handling, holding, scheduling, tracking, shipping, storage, and temperature and humidity maintenance requirements, procedures, and related preparations.

3. Weigh $PM_{2.5}$ filters from Kansas City, Springfield, and the ESP sites (see appendix 3 for the total number of PM2.5 filters to be analyzed per month).

4. Store and maintain $PM_{2.5}$ filters as required in EPA guidelines.

5. Review $PM_{2.5}$ data for errors and malfunctions; send data to the APCP for uploading into AIRS.

6. Assist in evaluating the $PM_{2.5}$ operations and data provided by the local agencies, as needed.

ESP - Air Quality Assurance Unit

1. Audit instruments operated by the Missouri Department of Natural Resources and local agencies as listed in Appendix 2.

2. Review and evaluate QAPPs and SOPs from MDNR, local agencies, or industries as described in Section B.1 of this QAPP.

3. Conduct performance and technical systems audits on industry monitoring sites as time allows.

4. Participate in a St. Louis City system audit.

5. Certify gases and instruments as per ESP AQAU SOPs.

6. Review and evaluate QC data from MDNR, local agencies, or industries as requested by the APCP.

7. Research and develop QA procedures for new monitoring technology used and anticipated to be used in S/N/S network.

8. Assist in development of State ambient air monitoring policies.

9. Provide technical assistance to air monitoring field staff from other agencies.

10. Maintain traceablity standards.

2. Problem Definition / Background

Refer to Missouri's Air Quality Monitoring Plan.

Between the years of 1900 and 1970, the emissions of six criteria pollutants (particulate matter, sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone and lead) increased significantly. As a result of the 1970 Clean Air Act (CAA) and its amendments, State agencies are required to establish and maintain State Implementation Plans (SIP) which outline the policies and procedures used to assure CAA compliance with the National Ambient Air Quality Standards (NAAQS) for the criteria pollutants.

In addition, the revised NAAQS for particulate matter were promulgated on July 16, 1997. Particulate matter is a general term used to describe a broad class of substances that exist as liquid or solid particles over a wide range of sizes. As part of the Ambient Air Quality Monitoring Program, state and local agencies will measure two particle size fractions: those less than or equal to 10 micrometers (PM_{10}), and those less than or equal to 2.5 micrometers ($PM_{2.5}$). The two category sites under PM2.5 monitoring program are:

Category A stations located in areas of expected maximum concentrations. These are not allowed to be smaller than neighborhood scale for $PM_{2.5}$.

Category B stations combine poor air quality with a high population density, but are not necessarily located in an area of expected maximum concentrations. These must be neighborhood or urban scale for $PM_{2.5}$.

Air quality samples for each pollutant are collected for one or more of the following objectives:

1. To judge compliance with or progress toward meeting Ambient Air Quality Standards.

2. To activate emergency control procedures that prevent or alleviate air pollution episodes as well as develop long term control strategies.

3. To observe pollution trends throughout the state, including non-urban areas.

4. To provide a database for research and evaluation of different effects: urban land-use, transportation planning, development and evaluation of abatement/control strategies, and development and validation of diffusion models.

With the end use of the air quality samples as a prime consideration, the network should be designed to:

1. Determine highest concentrations expected to occur in the area covered by the network

2. Determine representative concentrations in areas of high population density

3. Determine the impact on ambient pollution concentrations by significant sources

4. Determine general background concentration levels

5. Determine the extent of regional pollutant transport among populated areas and in support of secondary standards, and

6. Determine welfare-related impacts in more rural and remote areas (such as visibility impairment and effects on vegetation).

The State and Local Air Monitoring Station (SLAMS)/National Air Monitoring Station (NAMS)/Special Purpose Monitoring Stations (SPMS)/$PM_{2.5}$ Ambient Air Quality Monitoring Network Program consists of three major categories of monitoring stations or networks that measure the criteria pollutants. These stations are described below.

1. The SLAMS consists of a network of monitoring stations. The SIP provides for the implementation, maintenance, and enforcement of the national ambient air quality standards in each air quality control region within the State.

2. The NAMS are a subset of the SLAMS network with emphasis being given to urban and multi-source areas. In effect, they are key sites under SLAMS, with emphasis on areas of expected maximum concentrations (category A) and stations, which combine poor air quality with high population density (category B). Generally, category B monitors would represent larger spatial scales than category A-monitors.

3. The SPMS provide for special studies needed by the state to support SIPs and other

air program activities. The SPMS are not permanently established and, thus, can be adjusted easily to accommodate changing needs and priorities. The SPMS are used to supplement the fixed monitoring network as circumstances require and resources permit. If the data from SPMS are used for SIP purposes, they must meet all Quality Assurance (QA) and methodology requirements for SLAMS monitoring. If the data are not used for SIP purposes, the data quality objectives and QA Quality Control (QC) requirements will be stated in each SPMS project description.

In addition to these three types of monitoring sites, source-oriented sites may be operated by industry as a condition of air quality permits.

3. Project /Task Description

Data collected by the network will be used to determine compliance with the NAAQS, to satisfy SIP requirements, to determine if new or expanded pollution sources should be allowed to operate, and to provide air quality data to satisfy the EPA requirements.

4. Data Quality Objectives and Criteria for Measurement Data

The Data Quality Objectives (DQO) of the SLAMS/NAMS/SPMS/$PM_{2.5}$ Ambient Air Quality Monitoring Program are to provide valid data which may be used for purposes of enforcing the law and other objectives relating to the NAAQS, as outlined in Section 2.

For $PM_{2.5}$, the DQO is based on the annual arithmetic mean NAAQS. The $PM_{2.5}$ standards are a 15-$\mu g/m^3$ annual average and a 65-$\mu g/m^3$ 24-hour average. The annual $PM_{2.5}$ standard is met when the 3-year average of annual arithmetic means is less than or equal to 15 $\mu g/m^3$. Due to rounding, the 3-year average does not meet the NAAQS if it equals or exceeds 15.05 prior to rounding. The 24-hour average standard is met when the 3-year average 98^{th} percentile of daily $PM_{2.5}$ concentrations is less than or equal to 65 $\mu g/m^3$. Based upon an acceptable decision error of 5%, the DQO for acceptable precision is a 10% CV and bias is + 10%. These precision and bias values will be used as a goal from which to evaluate and control measurement uncertainty.

Measurement quality objectives are defined by the following criteria: precision, accuracy, representativeness, completeness, comparability, and delectability. Where:

a. Precision – is measured against the mean value of the data set.

b. Accuracy – is measured against the actual analyte concentration.

c. Representativeness – How relative is the data to the target parameter.

d. Completeness – is measured against the expected amount of data.

e. Comparability – is established by uniform application of siting and other criteria.

f. Delectability – is the lowest concentration the method used can reliably measure.

5. Special Training Requirements/Certification

Personnel assigned to ambient air monitoring activities are expected to have met the educational, work experience, responsibility, personal attributes, and training requirements for their positions. These requirements are outlined in the air monitoring staff personnel position description forms submitted to the St. Louis City Human Resources Office. Records on personnel qualifications and training are maintained by the state agency and are accessible for review during audit activities.

Adequate education and training are integral to the St. Louis City and MDNR monitoring program. Training is aimed at increasing the effectiveness of employees and their organization. Appropriate training shall be available to all employees supporting the Ambient Air Quality Monitoring Program, commensurate with their duties. Such training may consist of classroom lectures, workshops, teleconferences, and on-the-job training. Suggested training courses are listed in the Quality Control Manual-Ambient Air Monitoring (QCM-AAM) section 2.1.

6. Documentation and Records

This table represents the categories and types of records and documents that are kept related to air monitoring. Current copies of all documents will be maintained at the specified locations. Copies of past documents will be kept at the agency's discretion.

Categories	**Record/Document Types**	**Location**
Management and Organization	State Implementation Plan	APCP, MDNR
	Reporting agency information	APCP - STLHD
	Organizational structure of monitoring program	QAPP – APCP-STLHD
	Personnel qualifications and training	APCP/ESP
	Quality management plan	ALPD
	Document control plan	QAPP – APCP - STLHD
	Network reviews	APCP
Site Information	Network description	APCP, STLHD
	Site characterization file	APCP, STLHD
	Site maps	APCP, STLHD
	Site audits	APCP, MDNR
Environmental Data Operations	FY 2004 S/N/S/$PM_{2.5}$ QAPP	APCP, STLHD
	Quality Control Manual for Ambient Air Monitoring	APCP, STLHD
	Standard operating procedures (SOP)	APCP,STLHD
	Field and laboratory notebooks	APCP,STLHD
	Sample handling/custody records	
Raw Data	Any original data	Hard copies are archived 10 years at APCP-STLHD
Data Reporting	Annual SLAMS air quality information	APCP - STLHD
	Data/summary reports	
	Journal articles/papers/presentations	APCP/AIRS APCP
Data Management	Data algorithms	APCP- STLHD
	Data management plans/flowcharts	QAPP- STLHD
Quality Assurance	Control charts	None
	Data quality assessments	APCP-STLHD
	QA reports	APCP-STLHD
	System audits	APCP-STLHD

B. Measurement/Data Acquisition

1. Sampling Process Design

SLAMS/NAMS/SPMS and $PM_{2.5}$, are all discussed separately (see Appendix 2).

Refer to the Quality Control Manual for Ambient Air Monitoring for:

2. Sampling Methods Requirements

These are listed by method.

3. Sample Custody Requirements

These are listed for, PM_{10}, and $PM_{2.5}$; they are not applicable for other monitoring methods.

4. Analytical Methods Requirements

These are listed by method.

5. Quality Control Requirements

These are listed by method.

Also refer to the Data Quality Requirements and Assessments in Appendix 5 for:

a. Detection Limits, Accuracy and Precision

b. Data Representativeness

c. Data Comparability

d. Data Completeness

6. Instrument/Equipment Maintenance and Calibration Requirements

These are listed by method.

7. Inspection/Acceptance Requirements for Supplies and Consumables

These are listed by method.

8. Data Acquisition Requirements

These are listed in Section 2 of the Quality Control Manual for Ambient Air Monitoring.

9. Data Management

a. Data Validation and Usability:

The collecting agency will screen data before reporting it to the APCP, MDNR by removing such things as calibration data and unverified data. Data, which cannot be verified will not be reported to the APCP (see QA/QC SOPs). The APCP will screen the data, including running it through the anomaly data computer programs and submit any questionable data to the collecting agency for validation. The collecting agency must respond as soon as possible but no later than five working days after the request.

b. Data Reduction and Reporting:

Data reduction will be in accordance with the APCP-STLHD SOP's. The collecting agency will report air quality and precision and accuracy data in authorized units (see Appendix 4. C.) as AIRS transaction electronic files within 60 days after the end of each calendar quarter (except for first FY quarter data, which will be submitted by February 15 of each year.

C. Assessment and Oversight

1. Assessment and Response Actions

Performance and Systems Audits

Performance audits consist of: evaluation of analysis results for samples sent out by the EPA to test the proficiency of laboratories; those performed on the operating monitoring equipment by state or EPA QA/QC auditors; and National Performance Audits required by EPA and conducted by the AQMS. The EPA may perform systems audits on the APCP and ESP. Quality assurance will be conducted according to guidance in the Quality Assurance Handbook for Air Pollution Measurement Systems (EPA-600/R-94/038a, April 1994 and EPA-454/R-98-004, August 1998).

Other corrective action: Refer to QAM-AAM.

2. Reports to Management

Type	Agency Responsible	Frequency	Receiving Agency
1. System Audits	EPA	Annual	APCP – STLHD APCP - MDNR
2. Completeness	APCP - MDNR	Quarterly; Annual	APCP - STLHD
3. NAAQS Exceedance	APCP - MDNR	Quarterly	APCP - STLHD
4. AIRS/AQ *	APCP- STLHD	Quarterly	APCP - MDNR
5. Audit	AQAU	Quarterly; Annual	APCP – STLHD APCP - MDNR EPA
6. National Performance Audit	EPA	Semi-Annual	APCP–MDNR ESP
7. Monitoring Network Review	APCP - MDNR	Annual	APCP–MDNR, EPA, ESP
8. SLAMS	APCP–STLHD	Annual	EPA
9. Verify Form	AQAU	Quarterly	APCP – MDNR, ESP
10. Ambient Data	APCP-STLHD	Quarterly	APCP-MDNR
11. Network Description Table Revisions	APCP	Quarterly	ESP, EPA, APCP-MDNR
12. Verification Response	ESP	As #9 is issued	AQAU, APCP-MDNR

* Will adopt AQS system after given direction from MoDNR

D. Data Validation and Usability

1. Data Review, Validation, and Verification Requirements

All data will be subject to peer review by a qualified analyst and the Chemical Analysis Section (CAS) or the Air Quality Monitoring Section (AQMS) Supervisor as appropriate.

Other data validation will be done as described in the AQMS QA Manual and in Section B of this QAPP.

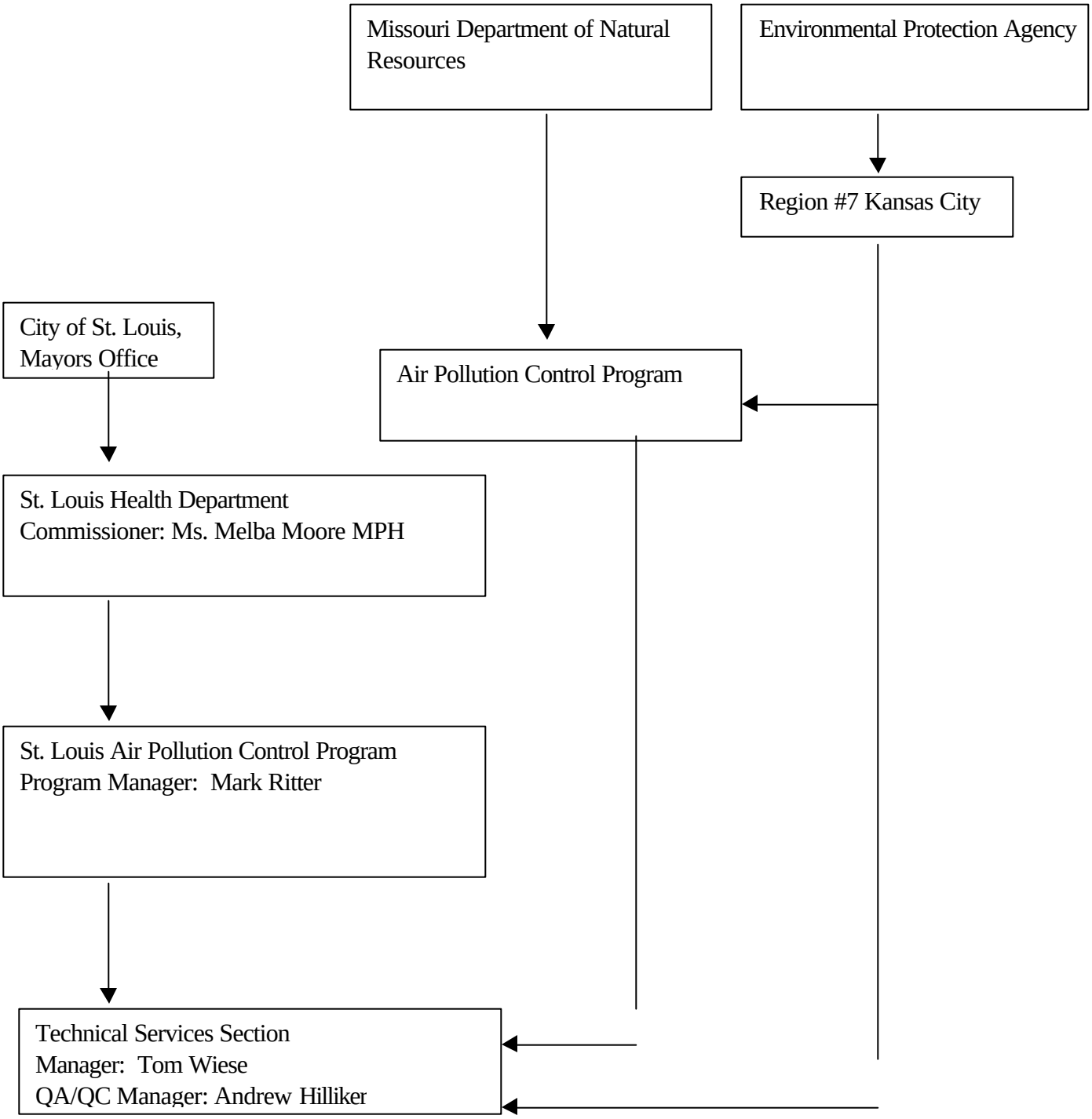
2. Validation and Verification Methods

All data will be validated in accordance with SOPs.

3. Reconciliation with Data Quality Objectives

Once the data results are compiled, the APCP-STLHD Monitoring Supervisor will oversee review of the data to determine if they fall within the acceptance limits. Completeness will also be evaluated to determine if the completeness goal for this project has been met. If data quality indicators do not meet the projects requirements, the data may be discarded. The project manager will determine the cause of the failure (if possible) and make the decision to discard the data (if necessary). If the failure is tied to the analyses, calibration and maintenance techniques will be reassessed as identified by the appropriate lab personnel. If the failure is associated with the sample collection, the sampling methods and procedures will be reassessed.

Appendix 1 – Organization Chart



Appendix 2 – SLAMS/NAMS/SPMS/$PM_{2.5}$ Ambient Air Monitoring network Project List

1. SLAMS/NAMS/SPMS Monitoring

1.1. APCP-STLHD Monitoring Section – Air Quality Monitoring Unit

Operate and maintain the SLAMS/NAMS/SPMS Ambient Air Monitoring network in the City of St. Louis . The St. Louis City Monitoring Network is presented in Appendix 7. The network design is in accordance with 40 CFR Part 58, Appendix D.

The following continued projects from the FY 2004 Quality Assurance Project Plan (QAPP) are also requested:

a. Continue to staff, maintain, and upgrade the Environmental Systems Corporation (ESC) Data Sharing System.

b. Continue working with the system to provide data for real-time ozone mapping of Saint Louis.

The following projects are requested for FY2005:

ESP – Air Quality Assurance Unit

Conduct routine audits of stations in the SLAMS/NAMS/SPMS Ambient Air Monitoring network consistent with the Network Table in Appendix 7.

Additional requested projects for 2005 QAPP:

a. Conduct audits on the following monitoring sites: 2 hivol samplers for FRM PM_{10} at Blair St. National Air Toxics Trends site

2. $PM_{2.5}$ Monitoring

2.1. APCP–STLHD Monitoring Section – Air Quality Monitoring Unit

Operate and maintain the $PM_{2.5}$ Ambient Air Monitoring network in the City of St. Louis. The $PM_{2.5}$ network is included in the Ambient Air Monitoring Network Table in Appendix 7. The network design is in accordance with 40 CFR Part 58, Appendix D.

2.2. ESP – Air Quality Assurance Unit

Conduct routine audits of $PM_{2.5}$ sites in the Ambient Air Monitoring network Table.

Appendix 3: Total $PM_{2.5}$ Filters Analyzed by ESP Per Month

	No. of Filters
4 PM2.5 Sites, everyday sampling	1460 samples, 416 blanks
1 Collocated PM2.5 site (every 6 days)	60 sampl;es, 17 blanks

Numbers of filters are based on: each everyday sampling container gets one blank, 3-day samples get 3-4 blanks per month, 6-day samples get 2-3 blanks per month, and approximately 2 lab blanks are required for each batch of 50 clean filters weighed.

Appendix 4 – ESP/AQMS Parameter Table

Parameter	No. of Samples	Sample Matrix	Method Reference	Sample Preservation	Holding Time	No. of Samplers
88101 $PM_{2.5}$	1825	Air	40 CFR 50 App L	**	**	16
88101 PM2.5 Continuous	8760	Air	(40 CFR 50 App. L)	NONE	NONE	1
81102 PM_{10}	480	Air	40 CFR 50 App J	**	**	8
81102 PM_{10} continuous	17520	Air	40 CFR 50 App J	NONE	NONE	2
42101 C0	*	Air	40 CFR 50 App C	NONE	NONE	0
42401 $S0_2$	*	Air	40 CFR 50 App A	NONE	NONE	6
42602 $N0_2$	*	Air	40 CFR 50 App F	NONE	NONE	4
44201 0_3	*	Air	40 CFR 50 App D	NONE	NONE	14
68101 Flow Rate	*	Air	40 CFR 50 App L	**	**	16
68102 Sample Volume	*	Air	40 CFR 50 App L	**	**	16
68103 Min Temp	*	Air	40 CFR 50 App L	**	**	16
68104 Max Temp	*	Air	40 CFR 50 App L	**	**	16
68105 Avg Temp	*	Air	40 CFR 50 App L	**	**	16
68106 Min Baro Press	*	Air	40 CFR 50 App L	**	**	16
68107 Max Baro Press	*	Air	40 CFR 50 App L	**	**	16
68108 Avg Baro Press	*	Air	40 CFR 50 App L	**	**	16
68109 Elapsed Sample Time	*	Air	40 CFR 50 App L	**	**	16
61103 Ws	*	Air		NONE	NONE	14
61104 Wd	*	Air		NONE	NONE	14
Sol. Rad.	*			NONE	NONE	2

*Refer to the Missouri Air Quality Monitoring Network Table in Appendix 3.
**Refer to the QAM-AAM.

Appendix 5 - Data Quality Requirements and Assessments

A. Detection Limits, Accuracy and Precision (95% probability limit):

Parameter	Detection Limits*		Accurancy		Precision	
	Req'd	Achieved	Req'd	Achieved	Req'd	Achieved
88101 $PM_{2.5}$	2.0 $\mu g/m^3$		4%		10%	
88101 $PM_{2.5}$ continuous	To be determined		To be determined		To be determined	
81102 PM_{10} (Hivol)	5.000 $\mu g/m^3$		20%		15%	
81102 PM_{10} (continuous)	10.000 $\mu g/m^3$		20%		15%	
12128 Lead	0.07 $\mu g/m^3$		20%		15%	
42101 CO	1.0 ppm		20%		15%	
42401 SO_2	0.01 ppm		20%		15%	
42602 NO_2	0.01 ppm		20%		15%	
44201 O_3	0.01 ppm		20%		15%	
68101 Flow Rate			4%		10%	
68102 Sample Volume			4%		10%	
68103 Min Temp			+2°		N/A	
68104 Max Temp			+2°		N/A	
68105 Avg Temp			+2°		N/A	
68106 Min Baro Press			10 mmhg		N/A	
68107 Max Baro Press			10 mmhg		N/A	
68108 Avg Baro Press			10 mmhg		N/A	
68109 Elapsed Sample Time			4%		10%	
61103 Ws	1 mph		+5% of observed speed		Not Specified	
61104 Wd	1 degree		+5% relative to true north		Not Specified	
63301 Sol. Rad.	Ly/min		Unit Dependent		Unit Dependent	

*Source: Lower detection limits, Quality Assurance Handbook for Air Pollution Measurement Systems, Vol II, part 1, App. 3

B. Data Representativeness:

Refer to the Missouri Air Quality Monitoring Network Table in Appendix 3.

C. Data Comparability:

Parameter AIRS	Preferred Units	Number of Decimal Places	Alternate Units	Number of Decimal Places
88101 $PM_{2.5}$	$\mu g/m^3$	1	NONE	1
81102 PM_{10}	$\mu g/m^3$	0	NONE	0
12128 Lead	$\mu g/m^3$	3	NONE	1
42101 CO	Ppm	1	$\mu g/m^3$	1
42401 SO_2	Ppm	0	$\mu g/m^3$	3
44201 O_3	Ppm	0	$\mu g/m^3$	0
42602 NO_2	Ppm	3	$\mu g/m^3$	3
68101 Flow Rate	%	1	NONE	1
68102 Sample Volume	m3	1	NONE	1
68103 Min Temp	^oC	1	NONE	1
68104 Max Temp	^oC	1	NONE	1
68105 Avg Temp	^oC	1	NONE	1
68106 Min Baro Press	Mm Hg	0	NONE	0
68107 Max Baro Press	Mm Hg	0	NONE	0
68108 Avg Baro Press	Mm Hg	0	NONE	0
68109 Elapsed Sample Time	Minutes	0	NONE	0
61103 Ws	Mph	1	NONE	0
61104 Wd	Degrees	0	NONE	0
63101 Sol. Rad.	Ly/min	0	NONE	0
Outdoor Temp. Temp(62101)	°F	1	NONE	1

D. Data Completeness:

The data must be complete enough for NAAQS analysis based on the NAAQS time periods. For purposes of evaluation, minimum criteria will be 75% of possible readings per quarter except for ozone monitors which require 96% daily completeness during the ozone season, April 1st - October 31st. A complete day of sampling for the one-hour standard for ozone is achieved when nine or more of the 12 hours from 9:00 a.m. to 9:00 p.m. are validly sampled. For the eight-hour ozone standard, eighteen valid eight-hour average samples must be collected.

Daily Samples (PM_{10}, $PM_{2.5}$, & Pb)

Time Period	**Minimum Requirement for Completeness**
24-hr sample every 6th day*	
Quarterly	12, 24- hr samples
Yearly	4 complete quarters
24-hr sample every third day	
Quarterly	23, 24-hr samples
Yearly	4 complete quarters
24-hr sample every day	
Quarterly	69, 24-hr samples
Yearly	4 complete quarters

*If sampling is more often than every 6th day, minimum requirements for completeness will increase proportionally.

Continuously Monitored Data (CO*, NO_2, NOx, NO, O_3, SO_2, Ws, Wd, PM_{10} Solar Radiation Temp. Outdoors.)

Time Period	**Minimum Requirement for Completeness**
3-hr average	3, 1-hr samples
8-hr averages	6, 1-hr samples
24-hr average	18, 1-hr samples
Daily	18, 1-hr sample
Quarterly**	75% of hourly values for gaseous, 75% complete daily samples for PM10 & Pb
Yearly**	4 complete quarters**

* Carbon monoxide will not be monitored by the ESP this year.

**All quarters and years are calendar quarters and years.

APPENDIX 6 - List of Acronyms

AIRS	- Aerometric Information Retrieval System
ALPD	- Air and Land Protection Division
APCP-MDNR	- Air Pollution Control Program, MDNR
APCP-STLHD	- Air Pollution Control Program, St. Louis Health Department
AQAU	- Air Quality Auditing Unit
AQMS	- Air Quality Monitoring Section
CAA	- Clean Air Act
CAFDF	- Custody and Field Data Form
CAS	- Chemical Analysis Section
CFR	- Code of Federal Regulations
COC	- Chain of Custody
DBMS	- Database Management System
DOPO	- Delivery Order Project Officer
DQO	- Data Quality Objective
EMPACT	- Environmental Monitoring Public Access Community Tracking
EPA	- United States Environmental Protection Agency
ESC	- Environmental Systems Corporation
ESP	- Environmental Services Program
FRM	- Federal Reference Method
GC	- Gas Chromatography
IEPA	- Illinois Environmental Protection Agency
IMPROVE	- Interagency Monitoring of Protected Visual Environments
MDNR	- Missouri Department of Natural Resources
MSA	- Metropolitan Statistical Area
MSSTL	- Monitoring Section, St. Louis Air Pollution Control Program
NAAQS	- National Ambient Air Quality Standards
NAMS	- National Air Monitoring Station
OAQPS	- Organization of Air Quality and Planning Standards
PAMS	- Photochemical Air Monitoring Station
PARS	- Precision Accuracy Reporting System
PPM	- Parts Per Million
$PM_{2.5}$	- Fine Particulate Matter
QA/QC	- Quality Assurance/Quality Control
QAPP	- Quality Assurance Project Plan
QCM – AAM	- Quality Control Manual – Ambient Air Monitoring
RO	- Reporting Organization
RSC	- Regional Speciation Coordinator
RTI	- Research Triangle Institute
SIP	- State Implementation Plan
SLAMS	- State/Local Air Monitoring Station
SOP	- Standard Operating Procedure
STLHD	- St. Louis Health Department

SLCHAL	- St. Louis County Health Department Air Laboratory
SPMS	- Special Purpose Monitoring Stations
XRF	- X-Ray Fluorescence

Appendix 7: SLAMS/NAMS/SPMS Ambient Air Monitoring Network

Site, Location	AIRS Code	Parameter
* Sta. #1, Tucker and Clark	(0072)	O3, Coll. O3, NO2
**Sta. #2, Broadway and Hurck	(0007)	SO2, WS, WD, PM2.5
Sta. #6, 4520 Margaretta	(0086)	O3, Coll. O3, SO2, NO2, CO, PM10, PM2.5
Sta. #7, 6204 Hall Street	(0088)	PM10 (Beta)
Blair, 3247 Blair	(0085)	PM2.5, PM2.5 Coll., Ws, Ws Coll., Wd, Wd Coll., PM2.5(TEOM)
Mound, 1716 Mound	(0087)	PM10, PM2.5
North Market #3 N. Market	(0092)	PM10 (TEOM)

- To be discontinued and moved to Blair, as soon as possible.
- ** Ozone discontinued at this site
- Sta. #5 10th and Washington: discontinued

~~Appendix 8:~~

ESTIMATED S/N/S MONITORING COSTS

Name	Loc	Equip	Cost	Dur	Unit	Price/yr
St. #1	**Clark**	1 Data Logger	5000	5	years	1000
		2 ozone monitors	10000	5	years	4000
		1 NOx monitor	10000	5	years	2000
		1 City Room Space	2500	1	years	2500
		1 Electricity	250	1	years	250
St. #2	**Broadway**	1 Data Logger	5000	5	years	1000
		2 ozone monitors	10000	5	years	4000
		1 SO2 Monitor	10000	5	years	2000
		1 PM2.5 Sampler	10000	5	years	2000
		1 Met	2500	5	years	500
		1 Tower	5000	10	years	500
		1 trailer	15000	10	years	1500
		1 Platform	5000	10	years	500
		1 Electricity	250	1	years	250
St. #6	**Margaretta**	2 Ozone Monitors	10,000	5	years	4000
		1 SO2 Monitor	10,000	5	years	2000
		1 NOx Monitor	10,000	5	years	2000
		1 CO Monitor	10,000	5	years	2000
		1 PM10 Sampler	10,000	5	years	2000
		1 PM2.5 Sampler	10,000	5	years	2000
		1 Met	2500	5	years	500
		1 Trailer	15000	10	years	1500
		1 Platform	5000	10	years	500
		1 Electricity	1200	1	years	1200
		3 Telephone	250	1	years	750
St. #5	**10 and Wash**	1 CO monitor	10000	5	years	2000
		1 Working Space Room	250	1	years	250
		1 Electricity	1200	1	years	1200
St. #7	**Hall Street**	1 PM10 Monitor (Beta)	10000	5	years	2000
		1 Trailer	15000	10	years	1500
		1 Electricity	1200	1	years	1200
		1 Telephone	250	1	years	250
	Mound	1 PM2.5 Sampler	10000	5	years	2000
		1 PM10 Sampler	10000	5	years	2000
		1 4x4 Building	5000	10	years	500
	N.Market	1 PM10 TEOM	20000	5	years	4000
		1 Met	2500	5	years	500
		1 Tower	2500	10	years	250
		1 Toll Shack	5000	10	years	500
		1 Electric	1200	1	years	1200
		1 telephone	250	1	years	250
	Blair	1 Data Logger	5000	5	years	1000
		2 PM2.5 Samplers	10000	5	years	4000
		1 PM2.5 TEOM	20000	5	years	4000
		2 Met	2500	5	years	1000
		1 Tower	2500	10	years	250
		1 8x8 Building	12000	10	years	1200
		4 telephone	250	1	years	1000
	spares	1 Data Logger	5000	5	years	1000
		1 PM2.5 Sampler	10000	5	years	2000
		1 PM10 Sampler	10000	5	years	2000
		1 Met	2500	5	years	500
		2 Ozone Monitors	10000	5	years	4000
		1 CO Monitor	10000	5	years	2000
		1 SO2 Monitor	10000	5	years	2000
		1 NOx Monitor	10000	5	years	2000
	Space	4 12 x 12 office room	4000	1	years	16000
		1 18 X 12 Buidilng	2000	1	years	2000
		2 Storage spots	1000	1	years	2000
		Smoke generators				
		1 Trailer	15000	10	years	1500
		Storage, work space				
		St. #4				
	Autos	3 Small Pickups	15000	10	years	4500
		1 Large pick up	25000	10	years	2500
		1 Automobile	20000	10	years	2000
		2 Panel trucks	20000	10	yreas	4000
	Gasoline	6 vehicles	750	1	years	4500
	Parts supplies, miscellaneous					
		8 sites	1000	1	years	8000
	Labor	1 Monitoring Manager	70,000	1	years	70000
		3 Air Poll. Spec. II	45000	1	years	135000
		2 Elec Inst. Tech	45000	1	years	90000
		1 Air Poll. Spec. I	38000	1	years	38000
					TOTAL	**468000**